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I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT COPY OF ONE OF THE CONTRACT DRAWINGS CONSTITUTING A PART OF CONTRACT NO. NYC-1990 IN THE FORM IN WHICH SAID DRAWINGS EXISTED AT THE TIME THE SAID CONTRACT WAS EXECUTED BY THE PARTIES.

DATE 1/16/98 Enthay A. Asla SPECIAL WRITER
DATE 4/10/98 P.K. Jernigan ENGINEER OF DESIGN

[illegible]

STANDBY POWER
5 WORLD TRADE CE

ELECTRICAL
SYMBOL LIST
& GENERAL NOTATION

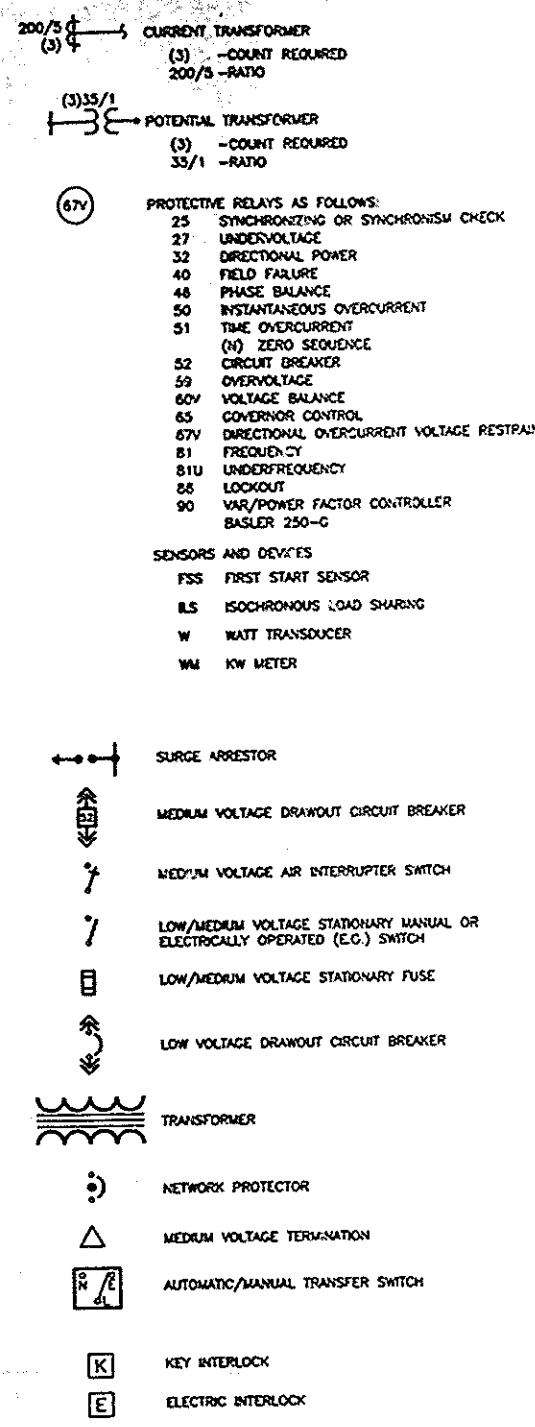
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<u>F.F.P.</u>	<u>M.A.R.</u>	
Designed by	Drawn by	

Date	Score
11/10/97	NONE

Contract Number	Drawings
WTC-945,071	EC

SINGLE LINE SYMBOLS

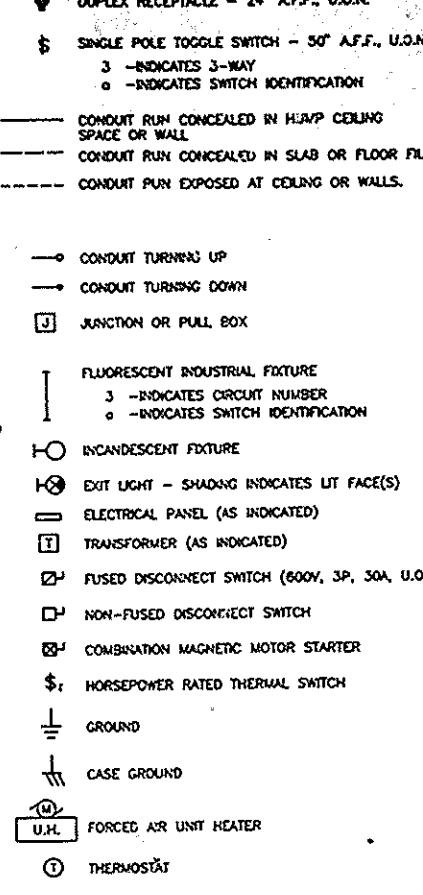


_____ HEAVY LINE INDICATES WORK TO BE DONE.

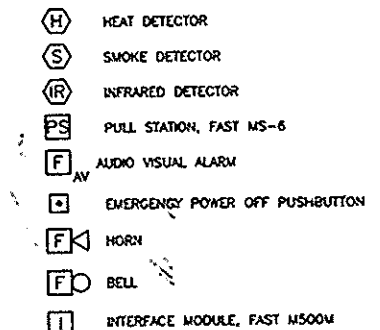
_____ LIGHT LINE INDICATES EXISTING WORK TO REMAIN

----- DASHED LINE INDICATES FUTURE WORK NOT PART OF THIS CONTRACT, UNLESS OTHERWISE NOTED.

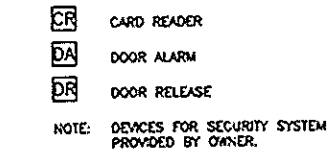
POWER & LIGHTING SYMBOLS



FIRE PROTECTION & EMERGENCY SYMBOLS



SECURITY & ACCESS CONTROL
SYMBOLS



ABBREVIATIONS

AA AMBIENT AIR
AF AMPERE FRAME SIZE
A.F.F. ABOVE FINISHED FLOOR
AM AMPSTER
A.S., AS AMP SWITCH
AT AMPERE TRIP RATING
AV AUDIO/VISUAL

UG BELOW GRADE

C CONDUIT, CONDUCTOR OR COIL
CB CIRCUIT BREAKER
COAX COAXIAL CABLE
CONT. CONTROL
C.T., CT CURRENT TRANSFORMER

DB DECBEL
DBC DIRECT BUS CONNECTION
DCMD DECOMBUSTION
DES DIESEL
DSC DISCONNECT (SAFETY SWITCH)
D.M., DM DAMPER MOTOR

ESMC ELECTRICAL SYSTEM MASTER CONTROLLER
ELEV ELEVATION
EMT ELECTRICAL METALLIC CONDUIT (THIRWALL)
EPO EMERGENCY POWER OFF

F.A., FA FIRE ALARM OR FAN FORCED AIR
FLUOR FLUOROSCINT
FUF FUSE
F.S., FS FIRESTOP OR FLOAT SWITCH
FVNR FULL VOLTAGE NON-REVERSING (STARTER)
F.O. FUEL OIL

G.D., GO GENERATOR DETECTOR
GEN GENERATOR
GL GRADE LINE
GND GROUND
GRC GALVANIZED RIGID CONDUIT

H HEAT
H.W. HARDWARE
H.S.B., HB HEADER BOX

INC INCANDESCENT
IR INFRARED

J.B., JB JUNCTION BOX

K WORK KEY INTERLOCK
KS KEY SWITCH
KVA KILO VOLT AMPERES
KVAR KILO VOLT AMPERES REACTANCE
KW KILO WATTS

LA LIGHTNING ARRESTOR
LMB LOAD MANAGEMENT BAY
L.V., LV LOW VOLTAGE (480V OR 120V)

M MOTOR
MCM THOUSAND CIRCULAR MILS
M.H., MH MOUNTING HEIGHT
M.V., MV MEDIUM VOLTAGE (15KV)

NG NON-GROUNDED

P POLE
P.B., PB PULLBOX
PC PROGRAMMABLE LOGIC CONTROLLER
PERNA PERSUASIVE
P.F., PF POWER FACTOR
PH., P PHASE
PUP PUMP
PHL PANEL
PS PARS
P.S., PS PULLSTATION; PRESSURE SWITCH OR POWER SUPPLY
P.T., PT POTENTIAL TRANSFORMER

R RELAY
REAC REACTOR

S SMOKE
S.C., SC STRESS CONE(S)
SEL SW SELECTOR SWITCH
SH SHIELDED
SOL SOLENOID
SW SWITCH
SWBD SWITCHBOARD
SWGR SWITCHGEAR

T TRANSFORMER
T.B. TERMINAL BLOCK
T.D., TD TIME DELAY
TEFC TOTALLY ENCLOSED FAN COOLED
TERM TERMINATION
TS TEST SWITCH
TW TWISTED
TVSS TRANSIENT VOLTAGE SURGE SUPPRESSOR
US UNIT SUBSTATION

V VOLTS
VM VOLTMETER
V.S., VS VC; SWITCH

W WIRE
WP WEATHERPROOF

Y WYE

1. THE CONTRACTOR

- APPLIFFMENTS, MATERIALS AND SERVICES TO MAKE INSTALLATION COMPLETE, FUNCTIONAL AND OPERABLE TO THE SATISFACTION OF THE ENGINEER.
- AS PART OF THIS CONTRACT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PURCHASE OF CERTAIN SUPPLIES AND APPURTENANCES TO MATERIALS WHICH WILL BE FURNISHED BY THE PORT AUTHORITY (PA), AS DELINEATED ON THESE CONTRACT DOCUMENTS. SUCH SUPPLIES AND APPURTENANCES MAY INCLUDE PULVEES, VECTORS, CONTROL, WIRING, CONTROL DEVICES, RACKS, SUPPORTS, VIBRATION ISOLATORS, ETC. AS PER THE MANUFACTURERS' VENDORS RECOMMENDATIONS.
- THE CONTRACTOR SHALL INCORPORATE ALL PERTINENT INFORMATION OF THE PA FURNISHED EQUIPMENT INTO HIS CONSTRUCTION PROGRAM. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INFORMATION SHALL INCLUDE BUT NOT LIMITED TO THE DIMENSIONS, LOCATIONS, CONNECTION DETAILS, INSTALLATION DETAILS, FUNCTIONS, ELECTRICAL, MECHANICAL AND POWER REQUIREMENTS FOR EACH PIECE OF EQUIPMENT WORK TERMINATIONS.
- THE CONTRACTOR SHALL COORDINATE WITH THE VENDORS OF THE PA FURNISHED EQUIPMENT FOR THE PURPOSE OF DELIVERY, PACKING AND PROPER HANDLING AND STORAGE. THE CONTRACTOR SHALL BE RESPONSIBLE TO ACQUIRE THE NECESSARY TECHNICAL SUPPORT FROM THE APPLICABLE MANUFACTURER(S) TO ENSURE PROPER INSTALLATION, OPERATION, MAINTENANCE AND REPAIR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IDENTIFICATION, LOCATION, AND REMOVAL OF ALL EQUIPMENT AND COMPONENTS INSTALLED BY HIM UNDER THIS CONTRACT.
- THE CONTRACTOR SHALL INSPECT, AND IF ACCEPTABLE, APPROVE ALL EQUIPMENT AND MATERIALS PROVIDED BY THE PA PRIOR TO HANDLING, STORAGE AND INSTALLATION.
- REFER TO THE CONTRACT SPECIFICATIONS FOR THE LIST OF REFERENCE DOCUMENTS PERTAINING TO THE SPECIFICATIONS OF THE EQUIPMENT, APPURTENANCES AND MATERIALS FURNISHED BY THE PA.
- THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITIES FOR THE LOSS OR DAMAGE OF THE PA FURNISHED EQUIPMENT AND MATERIALS NEGLECTED BY THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR OR REPLACE SUCH EQUIPMENT TO THE SATISFACTION OF THE ENGINEER. PULL, DAMAGE, OR DELAY TO THE CONTRACT SPECIFICATIONS RESULTED FROM THE LOSS OF DAMAGE.
- THE CONTRACTOR SHALL SUBMIT DETAILED CONSTRUCTION PHASING PLAN PRIOR TO STARTING THE WORK TO BE PERFORMED UNDER THIS CONTRACT, INCLUDING THE DETAIL OF TEMPORARY STRUCTURES AND EQUIPMENT NECESSARY FOR THE PROPER HANDLING OF THE MATERIALS AND EQUIPMENT WITH THE RISK OF DAMAGE TO EXISTING WORK, SCOURING, SUBSIDENCE.
- CONDUITS INSTALLED IN SHAFTS, CONCRETE ENVELOPES AND IN GARAGE DAMAST PLUMBING SPACES:
 - A) ALL WORK SCHEDULES MUST BE COORDINATED WITH THE PROJECTS CONSTRUCTION MANAGER.
 - B) PRELIM TIME MAY BE REQUIRED WHERE SPACE ACCESS IS THROUGH TENANT SHEDDING. THE INSTALLATION SHOULD BE COMPLETION. EXISTING SYSTEM SHUTDOWNS CANNOT BE TOLERATED DURING NORMAL WORKING HOURS AND ENVIRONMENTAL RESTRICTIONS, SPECIAL SUBMITTALS.
 - C) IN DETERMINING HOW CONDUITS WILL BE INSTALLED IN VERTICAL SHAFTS AND CABLES PULLED TO DESIGNATED PULL AND SPACE BOX LOCATIONS CONTRACTORS MUST COORDINATE WORK WITH THE ARCHITECT, STRUCTURAL ENGINEER AND PROJECTS CONSTRUCTION MANAGER. THERE ARE SOME FLOORS MAY BE MORE LIMITED THAN ON OTHERS. THE ACCESS PATH BETWEEN CONSTRUCTION STAGES AND AREAS AND THE ACCESS PATH BETWEEN CONSTRUCTION STAGES WITH THE PROJECTS CONSTRUCTION MANAGER, SCAFFOLDING AND TEMPORARY WORKING PLATFORM INSTALLATIONS, WHEN REQUIRED.
 - D) CONTRACTOR AND THE PROJECTS CONSTRUCTION MANAGER, ELECTRICAL ENGINEER AND CONSTRUCTION MANAGER, WHERE ACCESS TO THE SHAFTS REQUIRED REMOVAL OF EXISTING WALL, MATERIAL AND FINISH AND MAINTAIN THE REQUIRED RATINGS TO MEET CODE.
- WHERE HORIZONTAL CONDUIT RUNS ARE INSTALLED IN A CONCRETE ENVELOPE, DETAILS OF INSTALLATION AND SUPPORTS FROM EXISTING STRUCTURES SHALL BE SUBMITTED TO THE PROJECTS CONSTRUCTION MANAGER.
- CONTRACTOR MAY ELECT TO RELOCATE AND ADD TO THE PULLBOXES SHOWN AT BOTTOM OF SHAFTS AND IN HORIZONTAL RUNS TO FACILITATE PULLING. LOCATIONS MUST BE APPROVED BY THE PROJECTS CONSTRUCTION MANAGER.
- TEMPORARY STOP CABINETS SHALL CONTAIN TERMINATIONS FOR AUTOMATIC TRANSFER SWITCH REMOTE CONTROLS. AT STRIP CABINETS INDICATED ON DRAWINGS, SWITCH ON UPS MODULE AND OUTPUT TERMINALS TO POWER THREE PHASE TRANSFER SWITCHES. CONTRACTORS SHALL ADVISE THE PROJECTS CONSTRUCTION MANAGER FOR INSTALLATION OF UPS MODULES SHALL BE INCLUDED IN ALL OTHER STOP CABINETS. WHERE LOCATED FOR TRANSFER SWITCHES. ALL TEMPORARY STOP CABINETS SHALL HAVE A MINIMUM OF 20% SPARE TERMINALS. IN SOME RISERS, BECAUSE OF SPACE CONDITIONS, CONTRACTORS MAY BE REQUIRED TO REMOVE EXISTING WALL AND EXTEND WIRING TO A DESIGNATED LOCATION IN THE ADJACENT MECHANICAL ROOM.
- MAINTAIN CONTINUITY OF ELECTRICAL SERVICE TO ALL LIGHTING AND POWER CIRCUITS WHERE ALTERATION WORK EFFECTS DISTURBING OBSCURITY. TEMPORARY CIRCUITRY SHALL BE PROVIDED BY THE PROJECTS CONSTRUCTION MANAGER. THE CONTRACTOR SHALL CONFORM TO BUILDING STANDARDS.
- CONTRACTOR SHALL PROVIDE TEMPORARY LIGHTING IN SHAFTS, AIR PLUMBING, ETC. WHERE NECESSARY FOR INSTALLATION WORK AND PERSONNEL SAFETY. THE POWER SOURCE FOR TEMPORARY LIGHTING IN EACH AREA SHALL BE DESIGNATED BY THE CONSTRUCTION MANAGER.
- TEMPORARY WIRING ROULETTE IN TENANT SPACES, PUBLIC CORRIDORS, ETC. SHALL BE PROTECTED FROM ACCIDENTAL CONTACT IN A MANNER APPROVED BY THE PROJECTS CONSTRUCTION MANAGER. TEMPORARY WIRING SHALL BE REMOVED WHEN NO LONGER NECESSARY FOR INSTALLATION WORK.
- WIRE SOLENOID VALVE ON FUEL OIL LINE FROM HEADER ON EACH GENERATOR TO THE ENGINE START-STOP CIRCUIT. SEE DWG. M2-04.
- IN GENERAL, BULKHEAD CONTRACTOR SHALL PROVIDE AND INSTALL SOISORS ON 1" FIBER OPTIC CABLES TO MONITOR TEMPERATURE AND VIBRATION CONTROL AND MONITORING SYSTEM VIA INTERFACE MODULE. SEE DRAWING P2-04.
- ALL MISCELLANEOUS CONTROL INSTRUMENTATION AND SENSOR WIRING IN GENERATOR ROOM SHALL BE INSTALLED IN 1" ROOD STEEL CONDUIT AMONGST WITH #12 OR #14 WIRES AT THE END OF THE CONDUIT.
- WIRE FUEL GAUGES AND OVERFILL ALARMS ON B-2 LEVEL TO NEW FUEL MANAGEMENT SYSTEM (FMP). EXTEND WIRING IN ROOD STEEL CONDUIT FROM FMP TO ALUMIN LIFT AND SHUTOFF DEVICE AT FUEL INPUT CONNECTION POINT ON EXTERIOR OF BUILDING. SEE DWG. M2-06. EXTEND WIRING FROM FMP TO EXTERIOR AND CONNECT TO EXISTING BUILDING SCADA CONTROL AND MONITORING SYSTEM VIA INTERFACE MODULE.
- WIRE LEAK DETECTOR IN ROOD STEEL CONDUIT AT BOTTOM OF OIL RISER SHAFT TO FMR. SEE DWG. M1-03.
- ALL CONDUIT SHALL BE FLAMMABLE ROOD STEEL.
- 15KV RISER AND HORIZONTAL CABLES TO BE AUTHORITY FURNISHED EQUIPMENT FOR THE PROJECTS CONSTRUCTION MANAGER.